UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE R0

R4 1-8

REPLY TO: 3420 Biological Evaluation DATE: MAY 15 1987

SUBJECT: Cause of Douglas-fir Cankers on the Gasquet and Lower Trinity Ranger Districts (Report No. 87-8)

TO: Forest Supervisor, Six Rivers National Forest

At the request of George Lottritz, Forest Silviculturist, Forest Pest Management examined several plantations, natural stands, and the Big Lake Progeny test site on the Gasquet and Lower Trinity Ranger Districts on April 1 and 2, 1987. John Kliejunas, Plant Pathologist, was accompanied by Tom Simonson, Gasquet Ranger District Timber Management Assistant, on April 1; by Dan Heavilin, Lower Trinity Ranger District Silviculturist, on April 2; and by Michael Srago, Regional Regeneration Specialist, and George Lottritz on both days. The objective of the evaluation was to determine the cause of branch flagging and cankering of Douglas-fir observed on both Districts, and to provide a prognosis for potential impact of the problem on the areas examined.

Gordon Plantation 2 and 3, planted with Douglas-fir in 1978 and released with herbicides in 1982, was examined on the Gasquet Ranger District. The plantation is scheduled for manual release this spring. Dieback of terminal leaders, flagging of lateral branches, and mortality of a few smaller seedlings was observed. Cankers, characterized by sunken or depressed areas of cambium and phloem, were associated with the damage. Wood-boring insect larvae were common in and adjacent to the dead tissues. Damage was relatively light and appeared to be confined to one area of the plantation. Some trees were heavily-cankered, with 10 to 15 branch cankers present, while adjacent trees were unaffected. The affected area appeared to be on a more exposed site with rockier soil than other areas of the plantation. Symptoms of damage were not observed in a nearby non-released plantation suffering from severe brush competition.

Similar symptoms and cankers, but not insects, were observed at several locations on the Lower Trinity Ranger District. The first location was along Friday Ridge Road. Stem cankers were present on natural sapling and pole-sized regeneration along the roadside. Associated flagging of lateral branches suggested that the cankers began in lateral branches and then moved into the main stem. One area with cankered trees was on a slope were soil slippage had occurred.

Terminal dieback of Douglas-fir seedlings at the Big Lake progeny test site was common. In most cases, lateral branches had become dominant, indicating that the problem had been present for at least one growing season. Cankers, but not insects, were associated with the dieback.

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The fungus consistently associated with cankered tissues at all locations was a species of Sclerophoma, probably Sclerophoma semenospora. A Dothiora state was fruiting in association with the fungus on several cankers examined and may be the perfect state of S. semenospora. According to Funk (Funk, A. 1980. The Sclerophomas associated with dieback of Douglas-fir. Eur. J. For. Path. 10:53-57), S. semenspora has been associated with dieback of drought-affected young Douglas-fir in southern British Columbia, and is suspected of being a pathogen on stressed trees. Different species of Sclerophoma have been associated with drought, frost damage and other injuries.

The insect associated with the cankered tissues at Gordon Plantation was identified as the Douglas-fir twig weevil, Cylindrocopturus furnissi. Because it was found only in association with cankered tissues, it probably was not a primary pest. The stage of fungal damage present (annual cankers active last winter and this spring, with sporulation common) and insect activity (active larvae with some pupation occurring) suggest most fungal infection occurred last fall, followed by insect attack.

The weevil is capable of attacking and killing small branches on Douglas-fir reproduction and can sometimes be a problem on small trees in plantations. It normally does not damage large trees. Past experience suggests that weevil damage is associated with dry sites, periods of drought, or other tree stress factors.

Although damage by both the canker fungus and the Douglas-fir twig weevil are usually associated with environmental stress factors, the situations observed on the two Districts did not suggest a clear cause and effect. For example, no damage was seen in a non-released site on the Gasquet Ranger District, but was present in a progeny test site where no competing vegetation was present. Furthermore, rainfall on the two Districts has been normal the last few years and is about 80% of normal this year.

A possible explanation for the canker and insect activity is the occurrence of a late spring frost in 1986. Frost injury could cause cambial lesions that are particularly liable to fungal infection. Frost injury would likely be more common on southern aspects (Gordon plantation), where succulent spring growth susceptible to frost would occur sooner, than on northern or western aspects (non-released plantation). Brush cover on the non-released plantation would reduce frost damage by keeping nightly minimum temperatures higher. Frost injury would also be expected to occur in low-lying, exposed areas (Big Lake progeny test site).

Because environmental stress factors are implicated, if not proven, options available to reduce the observed damage are limited. Neither the canker fungus or the twig weevil would be expected to move from affected to adjacent healthy trees and cause addition damage under normal environmental conditions. Cankered trees in plantations should be discriminated against during scheduled thinning. Evidence of variability to cankering observed at Gordon Plantation suggests that trees cankered now will be more susceptible to future damage. Monitoring for possible twig weevil damage at the Big Lake progeny test site, where adverse impact to high value trees could occur, is suggested.